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SCIENTIFIC AFFAIRS

No. 656

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This serial report contains press and radio coverage on the development of and progress in the various theoretical and applied scientific disciplines and technical fields; and the administration, structure, personnel, and research plans of leading East European scientific organizations and institutions, particularly the academies of sciences.

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SCIENTIFIC AFFAIRS

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ENERGY FROM SPACE DISCUSSED

Sofia SOFIA NEWS in English 7 Nov 79 p 3

[Article by Prof Dr Kiril Serafimov, chairman of the National Committee for the Study and Utilization of Space]

[Text] The 30th International Astronautical Congress was held recently in Munich. One of the central problems of this prestigious scientific meeting was the development of space energy. Two Bulgarian scientists--Prof Dr Kiril Serafimov and Prof Dimiter Mishev--were elected to the new Space Energy Committee. SOFIA NEWS invited Prof Serafimov to comment on the problems of space energy.

"Our planet has been getting deeper and deeper into an objective energy crisis, and mankind has been pushed to do some very serious research into certain ideas that otherwise would seem to border on the fantastic. A most evident source of energy, to which our civilization could turn to meet its growing needs, is space--the boundless potentials of space energy.

"Two ways can be considered--one being to orbit bulky, energy consuming and ecologically dangerous industries into space and to return the ready production to Earth. The giant future industrial plants in space will have to use controlled nuclear, thermonuclear or solar power on board. As to the positioning, these factories could be orbited in near space, or placed on a stationary orbit (like the satellites which 'hang' all the time over one and the same point of the earth at an altitude of 36,000 km by rotating synchronously); entire space cities could also be set up in specific points, such as the gravitational 'cavity' between the Earth and Moon. Eventually, plants which consume inordinately much energy and set the pace in power generation growth will have to be transferred to the Moon, Mars or other planets.

"The second way of developing space energy is by putting giant nuclear or solar power generating stations on a geostationary orbit. Such stations could be effective even now, provided they are not less than 10,000 Megawatt in capacity. They would, among the other benefits, do away with the ecological dangers once and for all.

"Already, powerful solar energy stations are in the drafting board stage; they will consist of dozens of hectares of panels, capable of transforming solar energy into electricity. Whether nuclear or sun generated, the electric power in these stations will be converted into energy of ultra high radio frequency which will then be beamed to earth. Giant paraboloids on earth with a radius of several kilometres will receive it and put it to use either directly or reduced (in voltage) to or dinary alternating current.

"A number of the basic practical problems of space energy were reported at the Astronautic Congress in Lisbon in 1975 at which I read a paper on the Ecological Limits of Earth Energy and Space. It should be noted that the need to resort to space energy is by no means as distant a problem as would seem. On the contrary, it has been established that already by the end of the eighties, space energy will have to be developed at increased rates. The energy needs, and the ecological problems will force mankind to do it, or face an explosive critical situation. Evidently we can look up to more successful energy projects through the use of space, but there are still too many ecological dangers to overcome.

"Interesting studies are made in Bulgaria on the influence of powerful energy streams in the atmosphere. Some effective transformers of solar into electric energy are investigated, and so are the possibilities of setting up nuclear power stations on the basis of accelerated neutrons and other essential elements of space energy."

CSO: 2020

OBJECTIVES OF FIRST NATIONAL SYMPOSIUM ON PHYSICS, ELECTRONICS

Sofia VECHERNI NOVINI in Bulgarian 27 Oct 79 p 4

[Text] From 1 to 3 November 1979 the Society of Physicists in Bulgaria, Integrated Physics Center of the Bulgarian Academy of Sciences, Paisiy Khilendarski Plovdiv University, and the Ministry of Electronics and Electrical Engineering will sponsor in Plovdiv the first national symposium on "Physics and Electronic Development."

Unquestionably, today the application of electronics and its development in the world play a primary role in scientific and technical progress in all fields of science, technology, production, and way of life. Whereas until recently the production of electric power or steel was considered the basic indicator of economic and scientific and technical level of development of a country, today it is above all the level of application of electronics in scientific research, technology, the national economy, consumer services, as well as the utilization of the achievements in the latest fields of electronics and microelectronics that have become such an indicator.

In our country, particularly after the April 1976 BCP Central Committee Plenum, exceptional significance has been ascribed to the development and utilization of electronics. The July 1978 BCP Central Committee Plenum set as a basic strategic task of scientific and technical progress in the country the extensive development of electronics in all realms of life. The implementation of this strategic task requires the further development of electronics and the electronic industry in the latest and most promising scientific fields such as microelectronics, quantum electronics, optical electronics, etc.

Modern physics is having and will continue to have a strong influence on the development of electronics: so-called physical electronics, radio physics, and, at this point, to an ever greater extent optics, the border area between radio physics and optics known as quantum radio physics (or quantum electronics), physical acoustics, nearly all areas of modern solid state physics, many areas of modern nuclear physics (above all the so-called nuclear electronics, nuclear methods, and nuclear instrument manufacturing),

etc. There is hardly another more difficult example of human activities than electronics, where basic and applied research and research, development, and production activities are so closely interlinked, and where science has become so convincingly a basic productive force.

All this determines the great importance of the forthcoming symposium. It will be attended by about 250 scientific workers and specialists from the Bulgarian Academy of Sciences, the higher educational institutions, and the departmental institutes and enterprises, as well as guests from the USSR, the GDR, Poland, and Hungary. Thirteen plenary reports will be submitted on the basic direction followed in the development of contemporary electronics and the role of physics in it. Over 180 communications will be submitted on the results of linking our physics with the tasks of the National Program for the Development of Electronics in our Country and the development of new strategic directions in our electronics over the past two years.

In the course of the symposium a small exhibit of some Bulgarian developments will be presented.

The forthcoming national symposium will be a new important step on the way to linking our science with the needs of our country and, particularly, of production. It will contribute to the more extensive development of the forces of our physicists for the implementation of the tasks set with the national program for the development of electronics and the party decisions on the development of the most important strategic directions of electronics in our country.

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MODERN NUCLEAR EQUIPMENT NOTED

Sofia SOFIA NEWS in English 14 Nov 79 p 2

[Text] Interatominstrument Economic Association was set up seven years ago. It is the first of its kind in the cooperation between the Comecon countries which includes 15 production and foreign trade organizations of Bulgaria, Hungary, the German Democratic Republic, Poland, the Soviet Union and Czechoslovakia. It is concerned with the development, manufacture and delivery of nuclear technology. A representative of the TROUD daily talked with the Bulgarian engineer Ivan Traikof, Deputy Director General of Interatominstrument.

"Interatominstrument," eng. Ivan Traikov said, "coordinates the research and production activities with a view to raising the standard of production and satisfying ever more fully the needs of the member countries belonging to it.

"The development and manufacture of modern nuclear equipment is unthinkable without highly efficient international specialization and cooperation. Interatominstrument engages in various activities in this respect--it organizes the assembly and servicing of nuclear equipment and instruments, works out and coordinates technological policies in this direction, carries out joint tests and assessments of the technical standard of new products."

He further noted that the countries belonging to the association are doing well on the world market, offering quite a rich nomenclature. These are above all products of modern nuclear instrument making--detectors, dosimeters, isotope and nuclear physical devices which are widely applied in science, industry, agriculture and medicine. The equipment and apparatuses incorporating isotope sources of radiation--gamma defectoscopes and others, are unique in industry--for determining the quality of products and of welding seams, in medicine, for therapy and the sterilization of preparations, in agriculture, to increase yields and to control pests. There is also a wide range of devices designed to serve as protection from radiation.

As to Bulgarian participation in the work of Interatominstrument, engineer Traikov said that the Elektron corporation and the Electroimpex organisation

are doing it in many possible ways, not only by coordinating their scientific and technological policies and trade, but also through concrete specialization in production. In the framework of Interatominstrument, for example, Bulgaria has specialized in the manufacture of mobile gamma defectoscope laboratories, of isotope "fireplaces" (special equipment designed for operation with radioactive substances) and other products which are successfully made in an enterprise in the town of Stara Zagora. Besides, one of the servicing subsidiary enterprises of the association has been in operation for several years now in Pleven and it is an active centre for the introduction in production and efficient use of nuclear equipment.

"The work of Interatominstrument so far," engineer Traikof said in conclusion, "as a new form of joint action of the Comecon member states, has been highly rated, and this serves as a stimulus to better further cooperation. Plans are under consideration for the association to build its own plant. Wider specialization and cooperation enable Bulgarian scientific and technical thought and nuclear technology to take an ever greater part in Interatominstrument's work."

CSO: 2020

MEMORY CHIPS OF UNLIMITED CAPACITIES

Sofia SOFIA NEWS in English 7 Nov 79 p 2

[Article by Veneta Ivanova]

[Text] Electronic computer technique has become an essential component of modern world [illegible] have grown accustomed to the operation of computers and their faultless memory, to their perfectly accurate judgement and uncompromising attitudes. It is a technology which becomes obsolete very quickly as new and more perfect electronic devices are developed. It would be difficult for a non specialist to penetrate this seemingly hermetically sealed world of modern science.

These thoughts raced my mind as I entered the Computer Technique Institute in Sofia. Specialists from the institute had developed a new IEC 5067 storage device, and I was to find out about it. The volume of information it can handle is 200 MB or 1600 million binary symbols. This means that it can store 111,000 typewritten pages, as specialists claim, a capacity seven times greater than the possibilities of the device with a memory of 29 MB. The speed of in and output of information is 6.4 million digits per second or 2.5 times that of devices used so far.

"This device is the first of its kind in the socialist countries", explained engineer Ivan Mitev. "Within the framework of Comecon, Bulgaria has specialized in the production of external storage devices in large quantities. The new product is highly effective and will replace several devices used so far. It has already won two gold medals, at the exhibition Ten Years of Comecon Unified Electronic Computer Systems in Moscow and at this year's Plovdiv Fair. The Soviet Union, the GDR, Czechoslovakia and other socialist countries have shown keen interest in it. Bulgaria will come to rank in the electronic world after the United States, the FRG, and Japan."

Eng. Mitev's words sounded impressive. Still I tried to imagine how this memory unit functions in practice? Behind the glass partitions of the experimental laboratory, engineers in white overalls could be seen closely following multicoloured dots and knots of very thin wire. These handle billions of energy pulses every second. It is difficult to fathom how people had invented this "electronic" brain, in many ways more perfect than the human. The experts tried to be nice, and explained it had taken long years of enormous effort to develop such a device.

This is not the only development of the Institute.

A communication processor. EC 8371, the first of its kind in the socialist countries, is due to be completed soon.

Communication processor does not mean much to the man in the street. Engineer Mitev had to explain that it served as a means of carrying on the dialogue between man and computer. It is at the basis of ESTEL -4, a teleprocessing system, which transmits, receives and processes information at great distances. The processor uses special programmes to control terminal devices designed to put, and retrieve information from great distances, at a very high speed – one million operations per second. In this way it does the "hard job" of computers. Hundreds of terminals can be linked to it by communication lines. With the help of the processor, computer centres can be connected into one electronic brain. which is capable of carrying out various types of tasks set by the client factory or some other enterprise, no matter how far they might be. The maximum speed of transmitting data along the communication lines is very high – 35,000 bits (binary digit) per second.

The specialists also acquainted me with another interesting research and development project of the Institute. That is the new system of electronic computers, the EC 1035, which is a modification of the EC 1020 and the EC 1022 computers manufactured so far. It will find wide application in processing economic information, in scientific development projects and in space explorations. The new system has a considerably greater capacity, its speed in the processing of information is 2,5 times as high and it has a substantially larger memory. This is its main advantage over the systems used so far. Specialists are unanimous that the computer will be able to "read" information of dozen of millions of digits recorded on an area of one square millimetre. The future promises a still more fantastic prospect. It will be possible to contain all the world's literature in an electronic memory unit of 0.01 cubic millimetres.

After all these interesting data and facts I asked where the secret lies of these major successes.

"There are no secrets about it," explained engineer Mitev. "Bulgaria 's participation in the international division of labour within the framework of Comecon, and above all our cooperation with the Soviet Union, offers us ample opportunities. We arrange things in such a way as to avoid overlapping with other Comecon countries. Over 95 per cent of the production of separate devices has been made in cooperation with Comecon. We maintain active links with the leading electronic computer institutes of all the socialist and other countries.

"Bulgarian-made electronic computer products find a ready market not only in the socialist world, but also in Italy, the FRG, Denmark, Switzerland, Holland, Australia, Greece, Turkey, Kuwait, Lebanon, and Iran. Bulgaria is third in the world in the export of these products."

CSO: 2020

JOINT RESEARCH WITH HITACHI

Sofia SOFIA NEWS in English 7 Nov 79 p 2

[Text] The first session of the Joint Committee for Cooperation between the State Committee for Science and Technical Progress and Hitachi Ltd., Japan, was held in Sofia on October 29 and 30. It was noted at the session that mutual relations had been strongly activated and a number of visits of Japanese and Bulgarian specialists had taken place. Joint cooperation is realised chiefly in the sphere of power generation. Hitachi has taken part in research linked with the forthcoming construction of the Chaira pump accumulation hydro electric power station (South Bulgaria). During the last 45 years Bulgarian and Japanese specialists have worked jointly on preparing the blueprints for this project. [as published]

During the session a symposium was held at which Japanese specialists read papers on questions linked with the latest trends in the production of turbine pumps engine generators, as well as the computer control of electrical power distribution systems.

"The symposium was a useful exchange of views and ideas," Mr Masatoshi Kato, general manager of the Hitachi Power Generation, Transmission Group, told our SN correspondent. "Bulgaria and Japan are geographically distant, but this does not hamper our mutual cooperation which brings the people of our two countries closer together. We wish to work jointly not only in the sphere of power generation and the construction of hydro electric power stations. We could also cooperate in the use of computers and robots in industry and work together in third countries."

Scientific and technological cooperation between the State Committee for Science and Technical Progress and Hitachi will develop chiefly in power generation and electronics next year. Joint development of themes and projects for power stations is planned. A joint symposium will be held in Bulgaria on the subject of "The Optimal Satisfaction of Energy Needs in Countries with Poor Energy Resources." Questions linked with joint activity in the sphere of complete deliveries of mechanical and electrical engineering equipment for hydro electric power stations in Malaysia and Nigeria were also discussed.

It was decided to hold the next session of the Joint Committee in Tokyo in October 1980.

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EXPANDING BUSINESS WITH SPERRY UNIVAC

Sofia SOFIA NEWS in English 7 Nov 79 p 2

[Interview with Mr Erhhard Welxelbaumer, manager of Veinna branch of Sperry Univac, by Vetseslava Todorova--date and place not given]

[Text] My conversation with Mr Erhhard Welxelbaumer, manager of the Vienna branch of the American Sperry Univac Company quite unexpectedly started in Bulgarian. Seeing my surprise, he hastened to explain.

"My Bulgarian vocabulary is very poor indeed, but nevertheless I can mange an elementary conversation. This should not surprise you as I have been visiting Bulgaria two or three times every month for six years. Besides business, one comes to know many of the charms of a country."

Probably your regular visits speak of active cooperation with Bulgaria?

"Yes, and success is mutual. We cooperate in computer equipment. In 1977 our company delivered two double processor systems which are now faultlessly functioning in the Bulgarian National Bank and the State Planning Committee. We have signed a contract which also provides for reciprocal deliveries by Bulgaria. We bought typewriters from Isotimpex for one million dollars for the American market. We also import considerable quantities of disc packages from Bulgaria. We buy electric installation materials from Electroimpex, and medicines and pharmaceutical products from Pharmachim. We prefer to import finished industrial products instead of raw materials and farm produce.

"We have been regularly participating in the Plovdiv Fair for five years now and that helps to expand mutual business contacts.

"Personally I am well acquainted with the plants for memory and disc units in the towns of Turnovo and Stara Zagora. I have been impressed by their scale. All components for these units are manufactured there, a thing which is not typical of the West European plants of that kind, which buy the separate elements from different places and only assemble the products. Your disc packages operate very well on our machines and enjoy a great demand in the markets of the West."

Will there be any joint ventures between Sperry Univac and Bulgarian enterprises in the field of computer engineering?

"All the prerequisites exist for this. We intend to attract Bulgarian engineers and specialists to make the software for Sperry Univac systems to be marketed in other countries. Your specialists have very high qualifications. On a worldwide scale they are few in number. On the other hand the maintenance and operation of computer systems is becoming more and more expensive. That is why closer cooperation is essential. This will be the base for long term cooperation in third markets. Very important in this respect is the fact that Bulgaria manufactures many modern disc packages and devices of high quality, in the production of which your country has specialized within the CMEA framework."

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HIGH-PURITY NONFERROUS METALS

Sofia SOFIA NEWS in English 14 Nov 79 p 2

[Article by Maria Stoyanova]

[Text] The Bulgarian ore mining industry and nonferrous metallurgy are equipped with most advanced technology, and they work to world technical and economic standards. This accounts for the 9th and 16th place respectively which our country occupies in the per capita world output of lead and zinc.

Bulgaria is a pioneer in the effective development of poor copper ore deposits. A number of leading factories in the world now operate under a Bulgarian licence for the reverse electrolysis of copper at increased current density. Other Bulgarian licences have likewise been introduced--for the reverse electrolysis of zinc, a technology for separating arsenic and antimony from black copper, and another for the continuous discharge of slag from shaft furnaces in the production of lead and copper.

Bulgaria now has powerful ore dressing and metallurgical works. Bulgarian made lead, zinc and copper have achieved a 99.99 rate of purity which is an important indicator of our nonferrous metallurgy's progress.

The introduction of modern methods in prospecting for and mining of nonferrous metal ores, has been increasingly successful. For example, the Elatsi open cast mine, the biggest in the country, applies very modern technology. Construction time for the pit was cut by one year, and the amount of earth moving work, reduced by five million cubic metres.

Another copper deposit, Asarel, has large reserves of ore close to the surface. This warrants economic strip mining, and the construction of a big copper dressing works. Comprehensive studies of ore dressing in Asarel have been subordinate to profitability requirements. Experimental and industrial surveys have shown that the new ore dressing technology being developed at Asarel presents a number of original technical solutions which ensure a high degree of a complex utilization of the raw materials.

We should also mention the technologies introduced in dressing and making use of the slag which metallurgical enterprises and ore dressing factories emit. These waste products can be very important to the national economy: useful components can be extracted from them to ensure the overall utilization of raw materials, and conditions are provided for introducing wasteless technologies in the processing of mineral raw materials. Among other things, this is a prime requirement of environmental conservation.

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AUTOMATION IN FARMING MACHINES

Sofia SOFIA NEWS in English 14 Nov 79 p 2

[Article by Magdalena Assenova]

[Text] The automation of processes in agriculture is impossible without the use of electronic equipment and control systems of the machines. Eight years ago Bulgaria and the Soviet Union started working jointly in this sphere. A number of results have already been obtained. Bulgarian specialists from the radioelectronics institute in Sofia with the participation of Soviet specialists have developed the *USAK* and *KEDAR* systems which are applied for the automatic control of operations done by agricultural machines.

USAK is a universal system for automatic control. It is being developed in a modification of 24 channels, and it monitors the normal functioning of agricultural technology. If, for example, the machine shows signs of a breakdown, the system finds out exactly which of the working parts or links is out of order and immediately gives a light or sound signal. Economies resulting from the prevention of breakdowns during harvesting amount to several million leva. Bulgaria is now producing this system mainly to meet domestic needs and for exports to the Soviet Union.

The *KEDAR* checks electronically on the work of seeders, watching how the separate apparatuses carry out seeding, whether the necessary quantities of seeds reach the respective place within the required interval, etc.

The joint efforts of specialists from the institute of radioelectronics and from UKRAINEŞHOM institute in Harkov have now paid off handsomely. Two prototypes of automatically driven maize gathering combine have been successfully tested. The machine can operate at full technological speed, unattended. At the same time, operational time of the combine is increased. The system is now being manufactured at the electronics and non standard apparatus plant in Tolbukhin, NE Bulgaria.

Five years ago work began on the development of electronic control systems for entire technological processes. The result was the appearance of *SEATS* electronic system which controls the thinning out of sugar beet sowings, a labour consuming operation. Bulgaria has now started regular production of SEATS systems. According to the estimates of Bulgarian and Soviet specialists each of these systems does the job of 40 workers.

In 1977 the Committee for Agricultural Machine Engineering worked out a programme for the development and manufacture of electronic devices and control systems up to 1990. In 1978 first tests were made of the control systems of the KCC 100 ensilage combine.

Tests have now been completed of the automatic control of a grapes harvester. Work on the development of an automatic tobacco cultivating machine is proceeding in laboratory conditions. Another system, for automatic maize cultivation, is experimented at the moment. In a few years' time Bulgarian agriculture will use automated machines for all crops requiring cultivation.

The institute's scientific programme provides for the development and manufacture of automatic tomato and fruit sorting systems depending on the degree of ripeness. Also under development are electronically controlled systems for tractor sprinkler installations, manure spreaders, etc. The purpose is by 1990, at the latest, for all agricultural machines in this country to be equipped with automatic control electronic devices.

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CHEMICAL WEAPONS PRODUCED BY UNITED STATES, OTHER COUNTRIES

U.S., FRG Chemical Weapons

Sofia GRAZHDANSKA OTBRANA in Bulgarian No 9, 1979 pp 15-16

[Article by Engineer Major Nedyalko Panchev, candidate of chemical sciences: "Chemical Weapons in the United States and FRG"]

[Text] In connection with reports appearing in the press in 1979 about the explosion of a freight train carrying containers of poison gases and chemicals and the evacuation of around 25,000 people in the American State of California, as well as a similar catastrophe that occurred last year in the State of Florida, the editors have received inquiries about trends in the capitalist world towards the improvement of chemical weapons and the methods of storing them.

The question is still timely even now after the signing of the Strategic Arms Limitation Treaty (SALT-2) since we know from the communique of the summit meeting in Vienna that the need for a general, complete and verifiable ban on chemical weapons has been confirmed and that both parties (the USSR and the United States) are expected to step up their efforts to prepare a coordinated proposal which will be introduced in the Disarmament Committee.

It is also known, however, that warmongering circles in the United States--mainly the leaders of the military industrial complex and NATO--furiously oppose not only the signed treaty, but also all matters in respect of which the treaty that has been reached is supposed to operate in order to preclude the possibility of a new world war. These circles continue to develop and accumulate new types of weapons, including chemical weapons.

In response to the interest shown by readers, we are publishing the articles "Chemical Weapons in the United States and FRG" and "Binary Nerve Gases in U.S. Plans."

Demands for a ban on toxic agents were formulated as far back as the jurists of ancient Rome: "War is waged with weapons, not with poison." In the Petersburg Declaration of 1868 the European powers condemned the use of toxic agents in wartime. The famous conferences on the limitation of their use were convened in The Hague in 1899 and 1907, and on 17 June 1925 a protocol was signed in Geneva banning "suffocants, toxic agents and other similar gases, as well as bacteriological agents." Next, in 1952, came the introduction in the UN Security Council of the Soviet Union's proposal to append a ban on chemical weapons to the Geneva disarmament protocol (1953).

In 1966 the UN General Assembly called for strict observance of the principles and aims of the Geneva protocol, and in 1969 the socialist countries again proposed to the UN General Assembly that a number of substances such as nitrogen-mustard gas, lewisite, hydrocyanic acid and phosgene be removed from armaments. The Huntsville chemical warfare arsenal was liquidated and the rest were modernized. GB gas was produced at the Edgewood arsenal and at the Rocky Mountain arsenal (Denver, Colorado). In addition a $50-milllion plant for intermediate products was built at Muscle Shoals (Alabama), and an ammunition plant at the Denver arsenal. This entire complex functioned at full swing only up to 1957, after which the GB-gas production installations were mothballed in a state of readiness for rapid recommissioning.

In the same year Tamelin at the Swedish National Defense Research Institute synthesized a new family of toxic agents--the V-gases, characterized by exceptionally high toxicity. The next year the Pentagon made the decision to build a government plant in Newport, Indiana, which cost the American taxpayers about $14 million. The plant was put into operation in 2 years' time. It was equipped with automated monitoring and process-control systems. Three hundred people were employed there and in 7 years approximately 5000 tons of V-gases were produced, after which the plant was mothballed.

Stoll and Hofmann synthesized LSD-25 40 years ago, but the American militarists did not concentrate their attention on psychochemical warfare agents until after 1953. An accelerated research program concluded with the adoption of "BZ," a new "humane agent" for the temporary incapacitation of troops that was tested in Vietnam. A special plant was also built to produce it.

Whereas irritant agents were used mainly to "smoke out guerrillas" in the jungles in order to make them leave their shelters, enormous quantities of defoliants (substances causing leaves to fall off) and herbicides for the destruction of crops were used in order to disclose the location of units.

The herbicides that were used were by no means harmless to people and animals. In 1963 there were 9,000 casualties, and in 1969 alone, 28,500, including 500 deaths.

In recent years the attention of Western military specialists has focused on the use of natural toxic agents as well. Technologies have already been devised for the production of certain toxins such as saxitoxin and botulinum toxin. Materials published by the U.S. Congress about an investigation of the activity of American intelligence services mention, inter alia, that saxitoxin was adopted by the CIA for use as a diversionary toxin in the performance of secret operations. Its action is similar to curare but the antidotes for curare are ineffective in this case. This toxic agent depresses the enzyme cholinesterase just as nerve gases do.

An intensive scientific research program is under way today in the area of chemical warfare agents and bacteriological toxins. Its scale can be judged in part, for example, from the military laboratories at Camp Detrick in Frederick, Maryland, which are at work on psychochemical and bacterial agents.

All these and many other factors indicate wide-scale and all-round preparation by the military circles of the NATO countries to wage war using chemical weapons. The new chemical warfare agents and bacterial toxins in small doses do serious injury to the organism (Table 1).

Table 1

Toxicity of Certain Toxic Agents and Toxins (Comparative Experiments Performed With Mice Injected With the Substance in Abdominal Region)

1 Вещество	2 Минимална смъртоносна доза, мг/кг
3 Натриев цианид	10
4 Мускарин (психохимическо БОВ)	1,0
5 Табун	0,6
6 Зарин	0,1
7 V-газове	0,05
8 Тетродотоксин	0,008
9 Ботулинов токсин „А"	0,00000003

Key:

1. Substance
2. Minimum lethal dose, mg/kg
3. Sodium cyanide
4. Muscarine (psychochemical agent)
5. Tabun
6. Sarin
7. V-gases
8. Tetraodotoxin
9. Botulinum toxin "A"

Not only large, but also small capitalist states possess chemical weapons, and this inevitably leaves its imprint on the functions performed by civil-defense staffs, services and formations in our time.

According to the concepts of Western military specialists, chemical agents have a number of "advantages" over conventional and nuclear weapons. They injure or destroy only people, animals and plants, while property is saved. To produce them, the production capacity of the chemical and pharmaceutical industry can in part be used. On the other hand, international inspection of the production and development of new, highly toxic compounds is severely hampered.

Chemical agents have a so-called "spatial character of action:" whereas a bullet or a shell produces injury only when it is in flight, these agents contaminate the terrain and the layer of air next to the ground for a long time. Special resources are needed for protection against them and this makes it imperative that the entire population (including adults and patients, children and nursing infants) be supplied with them.

According to the assessments of Western specialists, a comparatively large missile carrying highly toxic agents such as V-gases is capable of producing direct casualties among 30 percent of the population in open terrain within a diameter of 1.5 km, which for a large city means the death of thousands of people.

Comparatively old information (1960) of the American Chemical Society Civil Defense Committee shows that a B-52 plane can contaminate up to 250 square kilometers with a chemical agent and up to 100,000 square kilometers with bacteriological agents. To be sure, this is possibly only provided that the missile or aircraft is permitted to perform its missions with impunity.

The capitalist countries' potential capabilities of using chemical weapons in any possible war make it imperative to carry out comprehensive and complete training of the entire population of the country, and especially of engineering and technical personnel. The chiefs, commanders and specialists of the Civil Defense System and the leaders of training groups--being familiar in detail with the characteristics of chemical agents' casualty effect, as well as with methods of timely detection, decontamination and protective equipment--must train formations and the population to react quickly in a complex situation and make the right decisions for action.

Something that merits special attention is the psychological training of servicemen, which is an important precondition for the right actions in carrying out the complex activities involved in the degasification of contaminated areas. It is necessary to know and continually to explain the great effectiveness of the individual equipment we have for the protection of the respiratory organs and of the body against the respective chemical agents and bacterial toxins. Collective protective facilities (dugouts, shelters), equipped with filter-ventilator units, make it possible for

people to stay in them for a long time. This, however, is achieved by advance training of formations and of the population. Clarification and strict observance of the instructions for the use of shelters is a mandatory condition--all the more so since the new, highly toxic agents make it imperative to use the protective facilities without delay. But all this can be achieved solely by the systematic and all-round training of every citizen.

U.S. Binary Nerve Gases

Sofia GRAZHDANSKA OTBRANA in Bulgarian No 9, 1979 pp 16-17

[Article by Senior Science Associate Boris Georgiev: "Binary Nerve Gases in U.S. Plans"]

[Text] Last year the world was shocked by a new surge of escalation in armament provoked by the U.S. military industrial complex. A presidential decree was signed not only for production of the components of the neutron bomb, but also for arming the American army with binary nerve gases, which had been experimented with for many years but not adopted for service on a mass scale. The news agencies reported that binary nerve gases would be produced at the Pine Bluff arsenal--one of the main centers for research on, and mass production of biological weapons (bacteria, viruses, Rickettsia). Chemical weapons (smokes, incendiary ammunition, the psychomimetic BZ, riot control gases including the superlachrymator C etc.) are produced here too.

At this military industrial center not only are formulas for biological and chemical weapons devised and introduced, but also bombs, projectiles and other ammunition loaded with biological and chemical weapons are produced and shipped to U.S. military bases all over the world or are left in a cold storage plant located in the region of the arsenal several hundred meters under ground.

What is the binary chemical weapon? It was developed on the principle of a twin-chamber arrangement of two low-toxicity compounds in one round of ammunition. At the moment of detonation they combine, forming a toxic agent with a powerful casualty effect on living beings.

The first bombs with such effect in the United States were created on the basis of arsenic compounds, and later on bombs with mustard-gas effect were produced too. With the discovery of, and extensive experimentation on nerve gases (tabun, sarin, soman and V-gases), demands began to be made for the introduction of binary gases on the principle of these supernerve gases, and as the second compound highly reactive mixtures that activate the formation of toxic agents are used.

In the United States it is believed that further improvement of chemical weapons involves extensive introduction of binary gases. For this purpose,

as far back as 1962 the Pentagon began to implement on a wide scale a special program to adopt binary chemical weapons for service. It is believed that this measure is of first-priority importance.

The Pentagon propaganda machine trumpets that binary chemical weapons have maximum promise of improvement because they are not subject to ban under existing international conventions. To be sure, there can be no ban on the production of the (in practice) nontoxic components of which these weapons are constructed since the components are also used for peaceful purposes (from them medicines, pesticides, household preparations--detergents, disinfectants etc. are made).

The mass production of binary chemical weapons can be organized much more rapidly than that of conventional chemical weapons which can be produced only in special chemical plants and laboratories staffed by specialized personnel. Moreover, any chemical plant whose production function is for peaceful purposes can be immediately adapted for the production of the nontoxic components of binary weapons.

The transoceanic militarists attach great significance to the fact that the production and storage of binary chemical weapons are safe. According to official data (because there are concealed cases, too), in 1969 23 American service personnel of the chemical weapons depots on the island of Okinawa, Japan sustained severe injuries from nerve gases. The same year an American serviceman sustained severe chemical intoxication with fatal outcome from working with chemical weapons at Fort Greeley (Alaska). An official representative of the Pentagon has admitted that from 1953 to 1960 more than 1000 persons were casualties in connection with the storage of nerve gases in the huge chemical depots at Rocky Mountain, Colorado, with the greatest number of accidents found among employees loading the ammunition and among depot laborers.

The production of binary chemical weapons makes possible the risk-free storage of reserves of their nontoxic components and, above all, the resale of those nontoxic components for industrial purposes before the expiration of their useful industrial life. This eliminates altogether the problem of destroying them. The destruction of reserves of toxic agents stored in depots is such a complex problem that in the past 15-20 years the United States, which several times (in most instances secretly!) has dumped in the ocean toxic agents that had become obsolete in respect of their combat characteristics or because of the shortening of their active life, encountered the resistance of public opinion throughout the world. In 1970 for months on end stories of news agencies throughout the world about the dumping of huge stocks of tabun and other toxic chemicals in the ocean were never absent from the pages of the newspapers.

These considerations make binary chemical weapons exceptionally suitable and promising for the plans of the U.S. military industrial complex. Here are some technical data about these weapons.

In 1962 an aerial binary chemical bomb, called "Big Eye" and intended for use on aircraft taking off from aircraft carriers, was developed for the air force and navy. Some models were also developed for ground forces, as well as artillery shells. In 1972 an experiment was conducted with the M-687 155mm artillery shells. Sarin is produced from two nontoxic components in the shell after it is detonated. The two components of the projectile are placed in polyethylene containers and can be safely stored for a long time. Before firing, the projectile is loaded with the two containers holding the chemical components. It is supposed that the basis of the binary chemical weapons is the so-called intermediate nerve gases standing midway between sarin and the Vx-gases. Among these, soman enjoys special popularity. The raw materials for its production are pinacoline alcohol (one container is loaded with it) and difluoromethylphosphonate (the other container is loaded with it).

The containers of the binary chemical weapons are usually made of plastic. Under depot conditions they are stored outside the ammunition casing (or only one of them is in the ammunition).

The working principle of the artillery binary chemical charge is comparatively the simplest. One of the most important elements of binary chemical ammunition is a special device for mixing the two chemical components. The working principle of the binary chemical aerial bomb is considered to be the most complex. This bomb consists of a casing, stabilizer and nose. The chemical can be in powdered state in one of the chambers. One of the components is in the casing with a mixer and is kept separate from the other by a thin metal partition. Before actual ejection of the bomb the pilot presses an automatic device that actuates the pyrotechnic assembly and destroys the partition wall. A small electric motor that promptly actuates the mixer is automatically switched on. In this way the two chemical components are mixed and generate toxic agents.

There is binary chemical ammunition with special holders containing one of the chemical components, while the second one is loaded in the space between the holders.

Binary chemical weapons can be used by spraying with an aerial aerosol. The two chemical components are in two separate chambers with mixing by an agitator and the generation of toxic agents taking place in a third (mixing and reaction) chamber. The resultant toxic chemical is sprayed on the target to be destroyed by means of an aerosol assembly.

The creation of binary nerve gases is an attempt to legalize antipersonnel supertoxic chemical weapons. Obviously the injury done by these toxic elements will be analogous to that of the hitherto-known conventional nerve gases (sarin, soman and Vx-gases).

The adoption of binary chemical weapons for service shows that the United States, despite its ratification (and that only in 1974) of the 1925 Geneva

Convention banning the use of toxic agents, is continuing an even more intensified armaments race, including armament with supertoxic chemical weapons--nerve gases. Whatever the possibilities may be of camouflaging this production by virtue of the use of nontoxic im[illegible]al components, their purpose remains the same--the conduct of infamous military operations for the destruction of people and animals--total biological genocide. This new rearmament production of the Pentagon's conceals a real danger to the peace and to the ecological equilibrium of the planet.

Defense against binary nerve gases is accomplished by putting on gas masks and protective covers immediately, as well as by using shelters. In case of need, injured skin areas are treated with the gas-casualty first-aid kit. It is also advisable to use antidotes for prophylactic or therapeutic purposes. Simultaneously with individual protection, a gas alarm is organized and mutual-aid and self-help measures are undertaken for personnel in the center of chemical contamination. Analogous measures are also taken for the protection of animals.

In order to employ all the above-mentioned measures rapidly and effectively, staffs, services, formations and the population must conduct constant training. The main thing in this training is for the personnel of formations and all citizens to gain firm knowledge and skills so as to use all available means of protection and of rendering mutual aid and self-help at the center of a chemical strike.

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BRIEFS

EASY CLEANING OF TANKERS--Researchers of the Hygiene and Occupational Diseases Institute with the Medical Academy in Sofia have helped to ease up the hard task of manual tanker cleaning. Under the guidance of Professor Dimka Zhecheva they have developed a paste which when dissolved not only washes out the remains of petrol, crude oil, residual asphalt and lubricating oil completely of the containers but also removes the rust. This new Bulgarian method makes it possible to clean the tankers sailing on their return voyage, when they are usually empty (so far the cleaning has always been done after the vessels have docked). When cleaned at sea, the rocking of the waves increases the cleansing effect. In the preparation of the solution seawater can be used and when, after cleaning a container, the petrol waste floating on the surface of the solution is removed with a special filter pump, it can be used to clean other containers. Since the paste is not toxic and does not pollute the environment, the processed liquid after filtering (the filter pump designed at the same Hygiene and Occupational Diseases Institute can catch both petro products and heavy metal ions) can be poured directly into the sea without any trouble. Besides being used in the tanker field, the new paste which has yet another advantage--that of being fireproof--will also be used in mechanical engineering for cleaning machine parts and motors--instead of benzine and naphtha. As the tests have shown, it can easily remove the hard layers of scale on the pistons and the other parts of internal combustion engines. The paste also promises to be useful in cleansing gas mains of rust and sludge. (BTA). [Text] [Sofia SOFIA NEWS in English 14 Nov 79 p 2]

CSO: 2020

OBSTACLES TO CREATIVITY, MOTIVATION IN SCIENCE DISCUSSED

Overcoming Ideological Barriers

East Berlin MESSEN-STEUERN-REGELN in German Vol 22 No 10, Oct 79 pp 542-545

[Article by Prof Dr A. Erck, Institute for Marxism-Leninism, Ilmenau Technical College: "Creativity and Responsibility of the Scientific and Technical Intelligentsia in the GDR." For translations of recent articles discussing science policy and problems of creativity in science and technology see the following JPRS issues of this series: 74375, 16 Oct 79, No 647, pp 7-15; 73460, 16 May 79, No 628, pp 19-24; and 72164, 1 Nov 78, No 605, pp 6-16. A translation of the East Berlin EINHEIT article cited in footnote 2 is published in JPRS 67825, 27 Aug 79, TRANSLATIONS ON EASTERN EUROPE: POLITICAL, SOCIOLOGICAL AND MILITARY AFFAIRS No 1285, pp 4-13]

[Text] 0. Introduction

Proceeding on the basis of socialist production and power conditions, the process of the social and intellectual-cultural adaptation of the working class and the other classes, strata and groups of working people corresponds to the nature of socialism. By its very nature this process is neither passive nor does it occur automatically. In fact to succeed a great deal of activism is required from all those involved. This claim also fully applies to the intelligentsia engaged in natural science and technology. Insofar as its members meet their alliance obligations vis-a-vis the working class and all other working people, its social activism evolves and is confirmed. This requires scientific-technological creativity at work and a sense of responsibility from every scientist and engineer, because this is the only way to advance scientific-technological progress in the proper manner and organize it in conformity with the needs of socialism. In the following I propose to deal with some aspects of the creativity and the responsibilities of the GDR intelligentsia engaged in science and technology.

1. The Significance of Scientific-Technological Creativity for the Organization of Developed Socialism

It is an important advantage of socialism for the development of the scientific-technical intelligentsia that it is part and parcel of the creative activism of society as a whole. This creative activism in turn is crucial for the organization of our social order generally because--on the basis of its vital as well as multifaceted dimensions--it represents the foundation for tackling the central social tasks in society. It goes without saying that scientific-technological progress is not achieved only--and not even primarily--by the scientific-technical intelligentsia. Nevertheless we may properly claim that it is largely responsible for the development of scientific-technological creativity.

The importance of scientific-technological creativity in socialism arises generally from the functions science (including the technical sciences) carries out for the revolutionary working class and the socialist society as a whole. It must be included in total societal considerations if we are to comprehend and realize this statement by the GDR party leadership: "We listen to the advice of science and assign the scientist a great deal of proper responsibility for the planning of scientific work, the quality of research, education and training and the social efficacy of science."[1]

G. Kroeber describes the functions of science for the working class and the socialist society as a whole as follows:[2]

1. Science as the union of natural, technical and social sciences is the instrument of the conscious direction and management of the social development processes.

2. The natural and technical sciences are productive forces of the socialist society or on the way to being so.

3. The sciences are crucial to social development because there is only one way to satisfy the steadily growing needs of man, that is by human knowledge and, ultimately, scientific-technological progress.

4. Science is a vital factor in the development of the socialist personality. We can do justice neither to science nor to art if we confront them as no more than consumers and spectators. In order to learn a scientific-technological discipline and appropriately exercise an eventual profession it is imperative to successively strive for an active and ultimately creative relation to learning and work. Linked to this is the opportunity by active-creative activism to fulfill one's own life, to be happy. It is in this meaning that Bertolt Brecht commented on Goethe's"Faust" by saying: "More happiness derives from the enrichment than from the plunder of the world."

The one-ness of these functions of science--and consequently also of scientific-technological creativity--in socialism constitutes its social significance. It also explains the tribute paid by the party leadership (especially in recent years) to the work of the natural science-technical intelligentsia.

Of course the coin also has a reverse side: For theory to illuminate practice, for the party leadership to be able to listen to the words spoken by science, the theory must indeed be a shining light, not a dim candle; scientists and engineers must really have something to contribute as a consequence of having gained important insights and created decisive technical innovations.

The esteem currently lavished in socialism on scientific-technological creativity by society as a whole must raise the motivation of the intelligentsia, encourage it to even greater efforts and require a further development of their sense of responsibility. After all, scientific-technological creativity is linked to the socialist society not only by its economic and social assumptions and effects. Indeed it is so linked also by means of its intellectual and, not least, moral elements.

2. On Some Specific Problems of the Development of Scientific-Technological Creativity in the GDR

We are all aware that the GDR is not a very large country, nor very densely populated. As to territorial dimensions the GDR ranks 101 in the world (its natural economic resources are therefore quite limited), as to absolute population figures it is No 38. In terms of foreign trade turnover, though, we claim 19th place and in terms of industrial production are ranked as high as No 10.[3]

The issue crucial for our problems as well as for our total social development is that of the GDR's status in science and technology. However difficult it may be to determine the criteria for defining the situation and however hard to announce a general statement with respect to various scientific-technological disciplines and the totality of scientific-technological development--we are bound to admit that we are not currently in 10th place in the world when it is a matter of science and technology. Given our limited natural resources and our fully stretched manpower capacity, though, we ought to achieve this status if we want to accomplish our social goals in the near and far future. These facts and targets also provide a need to link intensification and scientific-technological creativity, its economic benefits and social significance. The qualitative criteria for production are thus determined by the scientific-technological standard.

Starting from these considerations it follows in regard to the below mentioned specific problems encountered in the development of scientific-technological creativity in the GDR that these and many other requirements apply more emphatically to us and must therefore receive quite particular consideration.

2.1 Social Needs, Scientific-Technological Problems and Subjective Motivation

It is no simple matter to cope with the dialectic of objective social needs, of scientific-technological assignments and the subjective motivation of the working people for scientific-technological creativity,[4] because there is no simple causal link between them. The major need complexes of our economy, for example, do not as a matter of course either promptly or directly yield the appropriate assignments for the respective research, development or technologist collectives. And even if it were possible to achieve the adequacy of theoretical assignment and practical need development, it would still be necessary materially and--above all--ideologically to stimulate the subjective motivations which trigger the creative activism of the respective scientist and engineer as well as keep it going when difficulties are encountered.

Of course the social needs of the working people in socialism are seen to be the crucial basis of scientific-technological assignments and the most important propellant for the motivation of the natural scientific-technological intelligentsia. Nevertheless there are significant transitions between these aspects of scientific-technological progress, which constantly arise anew in our daily lives and must be constantly analyzed and coped with regarding their specific phenomena. Considered from this standpoint the presence of a social need is simply no guarantee for the definition of a scientific assignment which must be clothed in the "language" of the respective scientific discipline before it can become the basis of the efforts and motivation of a researcher, developer or technologist collective.

Sociological studies of researchers in the Soviet Union and engineering students in Ilmenau have shown that the undermentioned kinds of motives for scientific-technological creativity

-- Interest in the scientific-technological problem,

-- Interest in the social, and especially the economic benefit,

-- Interest in presonal success

are most effective when operating in conjunction. At the present time the strength of the motivation is still seen to be more important that the actual topic for the production of creative performances. The interest in new knowledge continues the outstanding motive to score great achievements. For these reasons it seems fitting to point out that it must be part and parcel of a creative climate in science and technology to provide the objective and subjective conditions for allowing the complex interrelations between social needs, scientific assignments and the motivation of scientific-technological creativity to develop with increasing perfection.

2.2 Coping With the Obstacles in the Way of the Rapid Advance of Scientific-Technological Creativity

Following the Ninth SED Congress it has become customary rigorously to reveal the reasons preventing us from developing and applying scientific-technological progress rapidly and with the greatest economic and social efficacy.

W. Kalweit, for example, spoke of the "brakes" on scientific-technological progress, which tend to be applied in particular in the organization and fulfillment of the plan science and technology. In this connection he mentioned the misinterpretation of the terms continuity and security of plan implementation (which are designed to avoid the risks inherent in science), and also the fact of the attitude of passive expectation maintained by many managements vis-a-vis the activism of the natural scientific-technical intelligentsia. He said that this is reflected in the fact that production tends to be so planned as to discount any important advances in the field of science and technology. If researchers, developer or design collectives nevertheless succeed in achieving production-effective results, management might consent to transfer them to industrial practice after all.[5]

Obviously such attitudes reflect ideological reservations toward actual scientific-technological progress. To counteract these must be an important prerequisite for the development of scientific-technological creativity in the GDR. We must also consider whether we are already enjoying the full understanding of the nature of science in general. This is important because narrowness in this respect is apt severely to obstruct scientific-technological progress. Lately, for instance, continuing from Marx' interpretation of human labor capacity, L. Laesker pointed out that the most important result of the work of scientists or innovators in social production is the training of people who are able and willing to be creatively active in their work and in their lives.[6] Certainly lively creative capacity must be reflected in the appropriate work results initially of an intellectual and ultimately of a material nature; but the greatest wealth of our society is represented by creative socialist personalities. To shape and encourage them is the prime task of the technical colleges.

2.3 Training in Scientific-Technological Creativity

Aside from ideological education the training of technical college students in scientific-technological creativity must represent the most important requirement of their communist education as a whole. Priority should not be assigned the production of the largest possible quota of graduates; it is much more important to raise the technical capacity and the politico-moral responsibility of future engineers.

At this point I would like to draw your attention to two aspects which are significant for the educational efficacy of college teachers as well as that of enterprise counselors to students and graduates. Following investigations at Thueringen universities, colleges and academies W. Kretschmar arrived at

the surprising conclusion that, of all students polled, engineering students are least motivated to acquire knowledge. Nor does their interest in basic science appreciably increase after they have completed factory and other practical training courses.[7]

As the interest in pushing back the limits of knowledge has proved to be the strongest of all motives, this fact indicates a serious problem in the training for scientific-technological creativity. The difficulties encountered arise from the fact that the problem largely results from the nature of engineering studies. The complexity of requirements and the ensuing lack of focus (focus is always very much present in the consciousness of students of mathematics, physics or linguistics) are the crucial causes of this defect which makes it much harder to achieve success in studying. By reason of the importance of the interest in knowledge for the development of scientific-technological creativity and the difficulty of encouraging this motivation we need great efforts by the colleges and industry to generally raise enthusiasm for the engineering profession as such. Success in this endeavor will enable us to help the evolution of the most important factor of scientific-technological creativity, that is the creative personality as such.

I would also like to indicate another problem in the training for scientific-technological creativity, this one from the aspect of the theory of culture. It is concerned with the development of the creative abilities of students. Among the creative abilities of the personality are the capacity for abstract thought and systematic work as well as relevant imagination (realistic fantasy) and empathy.[8] In accordance with the nature of scientific-technological creativity the ability for abstract thought and systematic work are crucial in the training for creative abilities. It follows that systematic heuristics, systematic design, the "cooperation" of man and machine, and so on, have resulted in a quite specific mentality among the natural scientific-technical intelligentsia. If not so trained the engineer will fail in his studies and in his profession. By contrast--and not without justification--imagination and, especially, empathy tend to somewhat recede into the background. However, should certain "threshold values" fail to be achieved, the system of creative abilities will collapse. It would therefore be necessary currently to assign greater importance to this element in the development of the creative abilities of engineering students. Art and literature must make a contribution here.

2.4 On the Value of GDR Space Research

The experiments carried out in space initially have a scientific-technological value in the narrower meaning. Tests in conditions of weightlessness, in the presence of intensive cosmic radiation (without atmosphere), in a vacuum, and so on, require a specific technology and facilitate specially valuable results.

Even greater is the scientific-technological value of this research for and in space. The preparation, execution and appraisal of space experiments

expands the labor capacity of the working people directly and indirectly involved therein. For the development of the scientific-technological creativity of a nation it is indispensable for at least some people to have prepared and carried out this kind of work. We can properly comprehend only that which we have done ourselves. The new mentality related to this can emerge only by active collaboration. And not even now have I fully described the significance of space research for the development of scientific-technological creativity in the GDR. As evidenced by the statements of scientists at the Carl Zeiss JENA VEB and the GDR Academy of Sciences such work has been immensely important for the evolution of scientific-technological self-confidence among the natural scientific-technical intelligentsia in the GDR. To record top achievements in science and technology (acknowledged as such the world over) in GDR conditions, with GDR materials and GDR management methods, is not only highly welcome--it represents an obvious incentive for scientific-technological creativity in other fields also.[9]

Let us also remember the fact that space research exercises a substantial recruitment effect for scientific-technological professions. It helps reduce certain prestige arrears by comparison to other academic professions and, at the same time, yields the natural scientific-technical intelligentsia "equality" of status in the mass media with sportsmen and artists.

Furthermore, within CEMA space research and the joint space flights of Soviet and GDR cosmonauts provide strong incentives for international cooperation in the field of science and technology. Such cooperation offers opportunities for fruitful international collaboration in the field of science and technology, such as is the case in INTERKOSMOS, which exceeds bilateral cooperation between socialist countries. They may serve as models for the responsible attitudes of the scientist and the engineer.

2.5 The Responsibility of the Natural Scientific-Technical Intelligentsia in Socialism

Responsibility as the moral or legal criterion of the freedom of the natural scientific-technical intelligentsia relates to the development of its scientific-technological creativity and to the application of its results for the benefit and the happiness of the working people. In his life's work the engineer is obviously involved with both aspects of this responsibility.

It is only possible appropriately to use those results of creative achievement, which have been earlier generated by the creative process. Once creative research and development results are to hand, responsible--and that includes rapid--utilization is the decisive factor. (Let us not forget that even in socialism it sometimes needs more creative initiative to translate genuinely novel scientific and technological results to daily life and social recognition than might have been required for their achievement.[10] Here also we cannot expect an innovation to be accepted without any effort.)

At the same time we must consider inappropriate for practical and moral reasons a division of labor within the natural scientific-technical intelligentsia

to the effect that one section creates the innovations and the other is responsible for its proper application.

At this time we may claim that, at the international level, a new phase has commenced in the discussion of the responsibility of the natural scientific-technical intelligentsia. It is characterized by the fact that the interdisciplinary discussion between natural, technical and social sciences has led to the proposal of a concept for the creation of a new scientific discipline, namely scientific ethics (15th World Congress of Philosophy, Varna 1973), and at the 18th UNESCO General Assembly (1974) in Paris a "recommendation on the status of scientific researchers" was adopted and given a fairly wide scope.

Evidently the member of the natural scientific-technical intelligentsia in the GDR has a responsibility in the following respects:

1. For learning the truth in his specialized professional sphere, for the truthfulness of the conduct of his profession, and for his efforts for social recognition of his verified results,

2. For the scientific-technological and social consequences (subsequent effects) of the application of his results,

3. For the process of the social, political and intellectual-cultural adaptation of the working class and the scientific-technical intelligentsia, including shared responsibility for the socialized training and communist education of future scientific-technical professionals,

4. For the precise definition of the goals of scientific-technological progress in the process of the organization of the developed socialist society.

Actually these standards should always be considered in close relation to the evolution of scientific-technological creativity as such. Let me quote Brecht again: "I have not found many occasions when I liked to say 'you ought.' One particular sentence, though, I like to use. It is: You ought to produce."

We must interpret the productivity of the natural scientific-technical intelligentsia in the GDR in the widest meaning of the term and in relation to the advance of socialism. That includes scientific-technological creativity as well as the emergence of a new intelligentsia, the production of ideas and material goods.

FOOTNOTES

1. Honecker, E.: "Die Aufgaben der Partei bei der Weiteren Verwirklichung der Beschluesse des IX. Parteitages der SED" [Party Tasks in the Further Implementation of the Ninth SED Congress Resolutions], Berlin, Dietz Verlag 1977, pp 51 and 52.

2. See G. Kroeber, "Science in the Process of the Organization of the Developed Socialist Society," EINHEIT No 31 (1976), II 5/6, pp 597-604.

3. Erck, A., Laesker, L., Steiner, H.: "Sozialismus und Wissenschaftliches Schoepfertum" [Socialism and Scientific Creativity], Berlin, Akademie-Verlag 1976.

4. "Materials of the Seventh GDR KDT [Chamber of Technology] Congress," TECHNISCHE GEMEINSCHAFT 26 (1978), No 12, pp 5-32.

5. Kalweit, W.: "The Status of and the Requirements on Scientists in the Further Organization of the Developed Socialist Society in the GDR," Conference of the Institute for Social Sciences at the SED Central Committee, 1976.

6. Laesker, L.: "Entwicklung der Wissenschaft und Wissenschaftliche Arbeit" [The Development of Science and Scientific Work], unpublished manuscript, Berlin 1977.

7. Kretschmar, W.: "Factors in the Attitude of Students to Learning," in "Jenaer Erziehungsforschung aus der Theorie fuer die Praxis" [Jena Educational Research from Theory to Practice], Scientific Essays by the department for educational sciences at Jena University (1976), No 2, pp 3-14.

8. Erck, A., Riemann, M., Traeger, F.: "Remarks on the Education of Students in Scientific-Technological Creativity," WOCHENZEITUNG DER TECHNISCHEN HOCHSCHULE ILMENAU 25 (1979), No 1, pp 19-37.

9. Pohl, H.-J.: "Contribution to the Discussion at the Ninth Federal Congress of the German Cultural League," in "Lebensweise und Kultur in der Entwickelten Sozialistischen Gesellschaft" [Lifestyle and Culture in the Developed Socialist Society], Berlin 1978, pp 86-90.

10. "Wissenschaftliche Entdeckungen" [Scientific Discoveries], Berlin, Akademie-Verlag 1974.

Legal Aspects of Risk-Taking

Potsdam-Babelsberg STAAT UND RECHT in German Vol 28 No 10, Oct 79 signed to press 30 Aug 79 pp 948-951

[Review by Erich Buchholz of the book "Verantwortung-Risiko-Recht" (Responsibility--Risk--Law) by Dr Dietmar Seidel, Institute for Theory of State and Law, GDR Academy of Sciences, Akademie-Verlag, Berlin, 1979, 102 pages. For further discussion of Dietmar Seidel and colleagues of legal aspects of promoting creativity and risk-taking in science and technology see the following JPRS issues of the EAST EUROPE REPORT: ECONOMIC AND INDUSTRIAL AFFAIRS: 73274, 23 Apr 79, No 1886, pp 10-24; and 73155, 4 Apr 79, No 1876, pp 23-36]

[Text] To successfully handle scientific-technological progress we must be prepared to take socially recognized risks, especially when approaching virgin territory. Socialist law also is largely involved. It is Seidel's commendable intention to examine this proposition and demonstrate the potential of socialist law for the stimulation of scientific-technological creativity. It is a great advantage that the book is not concerned with any specific branch of the law. In fact, preoccupied with legal theory, it aims to explain the fundamental relation between scientific-technological progress, socialist law, legal responsibility and risk, and to do so as comprehensively as possible. The author therefore endeavors to utilize the findings of other scientific disciplines such as economics, management science, philosophy and ethics. Here he primarily draws on Soviet science and acquaints us with some fairly unfamiliar ideas of the classics, especially Lenin.

The first major section of the monograph examines the status, classification and potential of creative and socially valuable risk as well as of socialist law, in particular the role of justification and responsibility in the stimulation of the creative actions of the working people, which involve risk. The author continues with a detailed explanation (yet to be critically appraised) of risk-taking "as a special phenomenon of creative action" and of a particular legal classification "risk."

The second major section is devoted to problems of the management and planning of scientific-technological progress, inclusive of the creative-risk taking actions of individuals, enterprises and combines. These studies range over specific questions of ascertaining legal responsibilities and the significance of "training for risk taking" in the development of socialist personalities. The book is more comprehensive than earlier publications in its ample treatment of the problems and the precision of theoretical situations and requirements, and it also demonstrates familiarity with many practical problems (a detailed analysis of practice is still outstanding). It deserves attention from economists, management scientists and management cadres as well as from jurists.

In the supplement which invites criticism the monograph raises two closely related and major questions. What can socialist law do to encourage risk taking scientific-technological creativity, and in which capacity should socialist law consider and deal with the risk taking phenomenon?

Evidently this touches on general problems of legal theory; insofar the monograph is also a contribution to the discussion of these, and we must respond to it. Let us remember that the writings by the young Marx on the issue of marital legislation rejected materialism and legal fetishism by saying, "the legislator...pronounces the internal laws of spiritual relations in conscious and positive laws."[1] We must realize that in socialism also the law does not create real life, cannot produce creative-risk taking action and can directly regulate, encourage and organize genuinely existing social processes only by pronouncing them right or wrong (illegal). It obligates the actors to certain actions or legally enables them to undertake certain kinds of actions.

In this meaning the words of the mature Marx apply to the possibilities for handling scientific-technological progress and stimulating creative-risk taking action. In his "Kritik des Gothaer Programms" [Critique of the Gotha Program] he said: "The law can never be above the economic organization of society and the cultural development related thereto."[2] While a legal provision requiring and approving scientific-technological progress and creativity in general may make sense in terms of insight and status, of collective self-interpretation so to speak, it will not do much if taken in isolation. Rather do we need a precise analysis of the real economic, moral and ideological conditions required for individuals, collectives and their managers in accordance with their interests to be ready, able and in a position (and induced to) develop risk taking-creative activism in the meaning of scientific-technological progress. Of course there are many factors militating against this, and Seidel duly lists them. It is also certain--and Seidel, again correctly, commits himself to this--that initially we need a general socially positive basic attitude to risk taking. However, as long as we fail to know the real operating mechanisms and conditions, including those of socialist law and the various legal norms, as long as we are unable exactly to define the specific individualized and individualizable requirements on action in terms of laws and obligations, we cannot come to grips with the actual problem.

Viewed from this aspect there must be reservations regarding the general and standardized definition of risk called for by Seidel (pp 47 ff) and, even more, regarding a specific legal classification "risk." Admittedly, it follows from the unity of socialist economics, the socialist state power, socialist ideology, socialist law and socialist morality that we must start from conforming basic positions and fundamental general criteria (and it is likely that Seidel in fact means to so no more than this, and something of this nature certainly remains to be fully discussed), but the specific legal organization must differ in accordance with the different assignments and regulatory methods of the various branches of the law. The penal code which is basically a law of sanctions, is primarily concerned "only" (see article 169 StGB [penal code]), to justify actions undertaken in the pursuit of acknowledged (economic) risk (and thereby indirectly to stimulate them).

By way of provisions regarding losses other branches of the law are concerned primarily with giving a direct positive incentive to creative risk taking. But what might or should the respective specific legal obligations and subjective rights be like? How is socialist law legally to formulate the risk phenomenon?

Initially (pp 36 ff) Seidel describes the characteristic features of risk taking, in particular uncertainty of outcome, hazard, and so on (here it seems to me that an unwarranted identification of risk taking with creativity intrudes and that the borderline between it and frivolous and negligent risk taking tends to get blurred). In theory (in the philosophical, psychological or management science meaning) this may result in a reflection of the

real phenomenon "risk," though I would prefer not to introduce a specific type of action called "risk" (p 44), especially because--and Wilke quite correctly says so on p 76--any action is more or less risky.

The work of jurisprudence (and that of ethics), on the other hand, is characterized mainly by the appraisal of modes of action, that is by either their legal acceptance or condemnation. It seems to me that this consideration, decisive for the work of jurisprudence, which evidently must be supported by theoretic analyses of the nature of the phenomenon to be appraised, has fallen somewhat short (the relevant passages only peripherally mention the words "justified" and "justification" on pp 44 and 55). In order, however, to be able to appraise and describe an action or mode of action as legal or illegal, the legislator and the person applying the law must have available the most unequivocal and objective criteria possible. This is where we come up against the real legal problem, the basic limits of the law.

Of course Seidel quite properly objects to any interpretation of the value or non-value of an action (and therefore its legality or illegality) in terms only of the advantage or disadvantage (damage) achieved by it causally (?) or even noncausally (!). Here he is supported by Bradter's well considered reflections (see p 26). He also and correctly asks that fake actions as well as actions intended as "reinsurance" and "shifts" of responsibility be revealed as such (p 27).

Still, it seems to me that he has not achieved the necessary practical intelligibility of the legitimacy of risk taking or a decision in and with the law. Just because Seidel himself (in other sections also) points out that the value of a discovery, a creative innovation or some other scientific-technologically relevant decision may not be fully appreciated until very much later, possibly by future generations only, the contradiction inherent in the problem and the nature of the law emerges even more sharply: We need now, that is before any relevant creative risk taking, to issue the standards and regulations, sufficiently clear (for all relevant subjects of the law) and mandatory on all, for what is a socially acceptable and justified risk decision or action, and what is not. The relatively easier penal model of a negative exclusion from the range of criminal action does not seem to me a suitable model for the outstanding main issue of positive stimulation.

Insofar as Seidel in this context points out the contradiction between the dynamism of social development and the stability or rigidity of the law and legal standards, this touches on the specific problem of the legal description of the risk phenomenon only because the difficulty already arises in trying to make the legality of risk taking intelligible. The problem can certainly not be resolved at the expense of the stability and the standardized provisions of the law unless the law itself is to be dissolved, thereby reducing to zero its high status--which Seidel strives for. Using the general definitions of the elements of a socially justified risk--he calls it legal classification (pp 47 ff)--there remains the necessity for drafting precise comprehensive and objective legal duties and subjective rights which,

in comprehensive interaction with economic, ideological, moral and other social factors, are suitable to stimulate the creative-risk taking attitude of the working people in order to encourage scientific-technological progress.

This, though, presumes the settlement of various economic and management issues (such as who is "to pay" for the risk, who will "profit" from it, or, in other words, how the "burdens" and benefits are to be apportioned). And that in turn requires our concentration on the relevant spheres of production and production preparation (instead of philosophizing about the risks inherent in any human activity), and also in the course of considering the differences between individual action and management decisions to take account of the special features of the objects and methods of regulation of the branches of the law involved. All of these are questions which cannot really be answered by a jurist. In the second part of his monograph Seidel provides many suggestions and thereby valuable stimuli for continuing--especially interdisciplinary--research. Now it is the turn of others.

FOOTNOTES

1. K. Marx/F. Engels, "Werke," Vol 1, Berlin 1958, p 149.

2. K. Marx/F. Engels, "Werke," Vol 19, Berlin 1962, p 21.

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COMMITTEE SETS TERMS FOR ENTERPRISE RESEARCH INSTITUTE OPERATIONS

Budapest KOHO ES GEPIPARI KOZLONY in Hungarian No 32, 26 Oct 79 pp 420-421

[Communique of the Secretariat of the Science Policy Committee Regarding the Further Development of Monetary Regulators of Research Institutes Under Enterprise Management and Research Places Under Budgetary Management, As Well As Regarding the Development of State Commissioning Systems]

[Text] The Science Policy Committee, in concert with what was included in joint communique number 105/1979 OT-PM [National Planning Office-Ministry of Finance] issued the 1 January 1980 modification of the economic regulating system and a resolution about the further development of the monetary regulators of research institutes with enterprise management systems and research establishments with budgetary management systems, and about the development of the state commissioning system. (This communique is an abridged statement of the resolution.)

I.

1. The nature of the activities of individual research institutes determines whether they operate according to the enterprise or the budgetary management system. In so far as the change in the institution's nature justifies it, the chief of the supervisory organ, in agreement with the finance minister, makes the decision on conversion, that is, initiates the reorganization of the research institute into an enterprise or other institution, or its attachment to an enterprise, university or other organization.

2. Through the further development of the economic regulators of research institutes on the enterprise management system

a) first, the following currently utilized regulatory elements must be maintained (among others):

--permission for the accelerated write-off of research instruments;

--complete retention of amortization, except for the value decrease of real property which must continue to be paid to OMFB [National Technical Development Committee];

--levying of the production tax (production carried on in target associations can be tax exempt for 1-2 years on the basis of individual decisions);

--financing to offset the expense burden in investments for research on their own initiative;

--the utilization of central wage bill regulation;

b) the following principles must be implemented:

--a predetermined range of profit proportional to sales receipts is tax free by regulation; within this the supervisory organ, evaluating the institution's total activities, especially the level of OKKFT [expansion unknown] task fulfillment, determines the size of the tax free range, the least amount of which is 60 percent of the amount set by regulation;

--profit above the tax free range is encumbered by linear tax paying obligation;

--the average tax burden of institutes should remain essentially the same level as it is currently;

--in the interest of accelerating the exploitation of research results, the institutes are to share in the fruits derived from the exploitation and realized in enterprises;

--the possibility for developing a more advantageous sharing basis for institutes must be ensured in case their receipts from the exploitation of their accomplishments, or rather from license adaptations, exceeds the proportion predetermined by regulation;

--mandatory level of the reserve basis is to be set at a lower level than the average, and its area of utilization is to be broadened (e.g. for risk premium goals, etc.).

The efforts directed towards determining specific levels and methods, in concert with the further development of the regulating system, must be performed in such a way that these may be instituted beginning 1 January 1980.

II.

3) During the process of further developing the regulating system of research establishments with the budgetary management system, the following basic principles must be implemented:

a) The remainder and accomplishment concern systems, with particular attention to characteristics of certain activities must continue to be utilized, while implementing the preferences and non-preferences of science policy.

b) Through the development of the regulators, achievement interest must be sought within system uniformity, while implementing the appropriate particular elements and dimensions of the different types of activities of research places;

--in the interest basis distribution and utilization of annual achievements developed on complex organizational level, personal incentives are to be distinguished from the accomplishments of state commissions given within the framework of OKKFT, and should depend upon the proportion of the income derived from the profits of practical implementation of research results, or from income from production and service activities;

--within the institutional restriction of annual reward possiblities, within the unchanging general level of interest, the total research activities of the research place must be considered. Personal interest attaching to contract work which does not qualify as preferred must be reduced from the current level;

--in the development of central research bases the monetary instruments must be centralized to a greater degree through profit withdrawals. In this way the financing of emphasized tasks included in mid-range ministry research plans may be assisted.

c) The fundamentals of the interest system of budgetary research places must be made to approach the regulators of research institutes with enterprise management systems, in order that

--the accounting for the actual investments for individual activities be assured;

--the method and degree of profit withdrawal regulate the ratios among various activities;

--in justified cases, the development of risk premium purpose monetary instruments within the interest bases be made possible.

d) In personal incentives, performance ratios must be provided for. Legal restriction of personal reward possibilities is not desirable, however, the provision for greater publicity in relation to income development is necessary.

4. In the interest of eliminating the practice of formal task financing, and the development of harmony among K+F planning, directive and financing activities, the Finance Ministry, the Hungarian Academy of Sciences and the Education Ministry, with the involvement of the ministries concerned, are providing the directional guidance.

III .

5. In the interest of better adapting research work to research tasks and programs, the method of state commissioning must be installed beginning with 1 January 1981. Until then only provisional agreements may be made for tasks belonging to this sphere.

6. Through the preparation of rules relating to the method of state commissioning, the following basic principles must be implemented:

--state commissioning for an especially important task, primarily one belonging to the framework of OKKFT, OTTKT [National Long Range Scientific Research Plan], the chief direction, or rather, program can be assigned by an authorized organ;

--the research place has the obligation of ensuring the priority of such commissioned work over other tasks;

--the commissioning agency may commission with the concurrence of the supervisory organ;

--budgeted and outside-of-budget resources, that is, resources available to the research places and centralized resources may be equally utilized for research assignments;

--the monetary instruments must be estimated and accounted for in relation to the tasks. The commissioning agency makes these available for utilization according to the rate of research. Amounts not utilized at the end of predetermined stages of research must be audited and, depending on the conclusion of the task, surrendered;

--in researches in the shpere of OKKFT, as well as in the carrying out of state commissions given for several assignments designated by ministries as highly important, more favorable than average incentive factors must be provided;

--following the conclusion of the research, the commissioning body evaluates the work completed comprehensively.

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EXPERIMENTAL INFECTION OF BULLS WITH CANDIDA GUILLIERMONDII

Budapest MAGYAR ALLATORVOSOK LAPJA in Hungarian Vol 34 No 9, Sep 79 pp 589-596 manuscript received 10 Jul 78

[Article by Dr Pal Sutka, Dr Pal Soos, Dr Bela Gorgey, Dr Ferenc Szepeshelyi and Dr Jozsef Varszegi; Main Station for Artificial Insemination in Central Hungary]

[Text] Enzootic candidiasis in ruminants, produced by Candida guilliermondii, was first observed in 1959 (7). The effect of the pathogen has been demonstrated in cases of cattle abortion (7, 5), uterine inflammation (4) and udder inflammation (10). In 1968 the C. guilliermondii fungus was isolated from the organs of bulls for the first time by us. In 1974 and 1975 it was also demonstrated by others in full semen (3, 11). In the course of our previous work we have reported the inflammation of the seminal vesicle and of the epididymis of breeding bulls caused by C. guilliermondii including the pertinent literature data, incidence, clinical, pathological and pathohistological appearance of the disease, the results of microbiological studies, and the taxonomic classification of the isolated strains of the fungus (12, 13). A more precise study of the pathognomy and details of the pathomechanism of the disease are discussed in the present article based on the experimental infection of two healthy bulls.

Experimental

Material and Methods

Two excellent sperm-producing bulls were used for the experimental infection. They were obtained from a group of bulls assigned for slaughter after obtaining the projected amount of deep-frozen semen from them at one of the artificial insemination stations. Bull No 5156, a Hungarian spotted Holstein-Friz (F_1) born in 1975, yielded 2360 doses of excellent quality deep-frozen semen during the 60-day period before the experiment. In the course of obtaining the semen, the bull always yielded material of a quality suitable for deep-freezing. Bull No 5217, a Hungarian spotted born in 1975, produced 1160 doses of excellent quality deep-frozen semen during

broth culture and of the fungus suspension was determined using first the Burker chamber followed by determination of the colonizing units. Inoculations were made both from the broth cultures and from the washed suspension on 2 pieces each of 10 percent blood agar plates one of which was incubated at 37° C in air and the other in 10 percent CO_2. The bacterium-free fungus suspensions were used in amounts described in table 1.

When using i.v., the fungus suspension to be administered were diluted with 120 ml of a 10 percent glucose solution at body temperature just before injecting it. In the case of bull No 5156, oral infection was done through a probe using the culture at body temperature. The infection experiments began 14 March and ended 9 May 1978 (56 days). The following tests were carried out in the course of the experiments.

Hemoculture was made from the jugular vein on Rosse-type medium 2, 3 and 4 hours after infection of bull No 5156 and 24 hours after infection of bull No 5217. The blood samples taken simultaneously, followed by daily withdrawals for 10 days and later once a week, were analyzed using the same methods as before the experiment. Urine samples (middle stream) taken from both bulls 3.5 and 6 hours after infection were subjected to cytological, bacteriological and mycological examinations.

Body temperature, pulse, respiration were recorded 2, 4, 6, 16, 24, 36, 48, 72 and 96 hours after infection followed by recording once daily at 17:00 hours for 10 days, and subsequently once a week at the same time. The infected bulls were made to ejaculate once a week. After qualitative evaluation and microbiological testing of the semen samples the ejaculates were deep-frozen using routine technological and storage methods. After 24 hours and 28 days storage of the samples, they were again subjected to qualitative evaluation and mycological testing.

The method of Blair et al. (2) was used to determine the bacteria found in the course of bacteriological tests both before and during the experiment. Grown colonies suspected of being fungi were transferred to Pagano-Levin-Trejo-agar and the bacterium-free cultures from a single colony were determined according to Lodder (9).

During the infection experiment, the bulls were kept in an isolated, locked building strictly enforcing the pertinent epidemiological regulations (disinfection, etc.). Following forced slaughter, bacteriological and mycological tests were carried out within 2 hours, on organ samples taken at the site, following the method described in a previous publication (13). Organ samples were also put into a 10 percent formaldehyde solution simultaneously. For pathohistological examination, the slides were stained with hematoxyline-eosin, according to Brown-Brenn and Grocott.

Results

The clinical, virological, bacteriological and mycological examinations performed before the experiment did not indicate the presence of infection in either bulls.

a) Clinical Findings

Following i.v. injection of the C. guilliermondii suspension and administration of the broth culture through a tube, toxic effects were noted within 30 and 45 minutes, respectively. These were manifested by muscle tremor, increased pulse and respiration rates, temperature elevation, tearing and elimination of solid, followed by liquid fecal matter. The data on pulse, respiration and temperature are contained in table 2. The graph shows a comparison of temperature data. The pronouncedly toxic effect lasted for 12 to 16 hours. After this the animals ruminated and ate up their fodder. During the toxic effect reddening of the scrotum was observed in both animals.

In the case of bull No 5156, the hemoculture prepared after the oral infection showed the growth of myceloid fungi after 7 days on both of the inoculated Rosse-type liquid media. The isolated strains proved to be C. guilliermondii. In the hemoculture of bull No 5217, prepared 24 hours after infection, C. guilliermondii was already growing on the fourth day of culture.

From urine samples collected 3, 5 and 6 hours after infection, myceloid fungi were demonstrated in both bulls by microscopic and culture methods. Similarly, the isolated strains proved to be C. guilliermondii. In urine samples collected 55 days after starting the experiment, protein was found only in the case of bull No 5217. Together with negative results on mycological testing of the samples, the presence of Proteus mirabilis bacteria was noted.

Bull No 5156 developed difficulties in voiding on days 3 and 4 following infection. It tried to void repeatedly in every case and kicked toward his abdomen. Rectal examination was negative except for the tightly filled bladder. On repeated attempt, urination started and became regular without any outside intervention.

Results of the hematological studies are contained in table 3. Following the initial toxic effect, both bulls developed lymphocytosis with a less pronounced decrease in the amount of red blood cells, by the 55th day of the experiment.

On clinical examination of the sex organs of bull No 5156, on the third day after infection, the scrotum and especially the epididymis were found to be painful, stiff and congested. In bull No 5217, in addition to a reddening of the scrotum and painful, stiff, congested epididymis on the right side, a sensitivity of the right seminal vesicle was also revealed by rectal examination. This sensitivity (light palpation of the seminal vesicle produced stamping by the bull) was evident as late as 14 days after the infection.

The qualitative values of the semen samples are contained in table 4. In the case of both bulls, in the 6 to 7th week after infection, high primary (18% resp. 16%) and secondary changes were demonstrated in the spermatozoa. Sperm quality was lowered, it could not be deep-frozen. On bacteriological and mycological examination of the sperm samples, the presence of a Proteus mirabilis strain was noted for the first time in the semen of both bulls. This could be demonstrated in every subsequent sperm sample examined until the end of the study. C. guilliermondii fungi were demonstrated in the fresh semen sample of bull No 5217 on the 21st day and of the bull No 5156 on the 49th day. The demonstration of C. guilliermondii from these ejacula was successful even after 28 days storage of the deep-frozen material.

b) Pathological and Pathohistological Findings

The most pronounced pathological and pathohistoligical changes were noted in the organs of bull No 5217, infected intravenously. Both in this animal and in the bull infected through a probe, the most severe changes were found in the sex organs.

The testes felt flaccid, the tail section of the epididymides were hardly separated from the testicles, they felt tough and full. On the entire surface of the testicles and epididymides as well as between the tunica vaginalis communis, thread-like connective tissue adhesions were present. On the cut surface of the testes, the glandular tissue was brownish-yellow and had the consistency of bacon.

In bulls experimentally infected with C. guilliermondii, the testes showing alterations can be described as follows. In addition to the contorted seminiferous tubules covered with several layers of germinal epithelium and showing the histological picture of spermatogenesis, there were varying numbers of contorted seminiferous tubules in which spermatogenesis was no longer taking place because the germinal epithelium cells had undergone varying degrees of degeneration or had died, especially at the spermatid layer, and separating from the tubular wall, they were blocking it. There were either no spermia or only a few degenerated sperm cells could be found in these tubules. Sprouting fungi and disintegrating bodies of fungi could be found in the connective tissue between seminiferous tubules, in their cavity as well as scattered among the Sertoli's and germinal epithelial cells.

The epididymal tubules of the infected bulls were, in general, filled with a large number of sperm cells and the tubular walls were covered with intact epithelium. However, there also appeared varying numbers of epididymal tubules which were filled with cell debris and a few degenerated sperm cells. The interstitium was increased between such tubules. In some of the tubules, the degenerated epithelial layer together with the connective tissue base was bulging into the lumens of the tubules in large sections. There were also found epididymal tubules with focal round cell invasions of the walls. Using the Grocott reaction, large numbers of roundish sprouting fungi

were demonstrated in the cavity of most of the tubules or rather among the epithelial cells lining the walls (pictures 1 and 2). Here, the pathomorphology of the fungus is characterized by one or two mother cells and a mass of various stages of daughter cells in a multipolar location.

The seminal vesicles have grown together with the surrounding connective tissue. In one-third of them the lobe-like structure was obliterated. In their glandular matter, especially in the cavity of the glandular endchambers, a rather large number of fungal bodies were demonstrated histologically with the Grocott method. In these glandular endchambers, the early degeneration of glandular epithelia and vacuolization of their cytoplasm was noted.

The lumph nodes in the groin were tough, massive to the touch. Using the Grocott method, roundish and oval shaped fungal bodies were found in the sinusoids of the lymph nodes, occasionally in large numbers. In the cortical matter of the kidneys scattered, dull, gray colored, wedge shaped infarcts were noted.

In both bulls, in addition to the lymph nodes of the groin, the presence of fungi could also be demonstrated in lumph nodes of the pelvic entrance and mesentery, in the hepatic portal lymph nodes as well as those of the thigh and knee joints. In bull No 5217, infected intravenously, peritonitis, and scattered, pinhead to lentil-sized foci of infarcts in the liver were found. The spleen was slightly enlarged with inflammatory adhesions to other organs. In the red pulp, in some places focal destruction of the lymphoreticular cells was observed. With the Grocott method, large numbers of fungus cells could be demonstrated at such sites (picture 3 and 4).

c) Bacteriological and Mycological Findings

Bacteriological cultures made from the organs failed to show infection. Therefore, it is possible that the presence of Proteus mirabilis bacteria found on microbiological examination of the urine and semen samples is the result of contamination which is presumably related to tissue destruction in the urinary and seminal duct areas by the fungus. In the course of simultaneous mycological examinations, C. guilliermondii fungus was demonstrated in the testicles, epididymides, seminal vesicles, adrenals and groin lymph nodes of bull No 5156 which had been infected through a probe, and in the epididymides, seminal vesicles, groin lumph nodes and pancreas of bull No 5217, infected intravenously.

Discussion

Volkheimer and Schulz (8) produced experimental candidemia and candiduria in healthy men following the oral administration of a large amount (80 g), that is 1.1 g/kg of C. albicans. In bulls, we achieved very severe changes in the sex organs, in addition to candidemia and candiduria, by the oral administration of about 120 g (0.16 g/kg) liquid mass of C. guilliermondii, and the i.v. administration of 14 g (0.014 g/kg) of the fungus. Based on

results of the clinical, mycological and pathohistoligical examinations, the bulls were made ill by the fungus which successfully settled in their organism. In our opinion, the extremely high invasive capability of the fungus deserves serious attention. Since it can reach the most varied internal organs very rapidly as a result of hematogenous scattering, the development of local processes is mostly just a function of the virulence of the fungal strain and resistance of the organism. It can be concluded from the results of pathological and pathohistological examinations that, among the internal organs, the most pronounced changes caused by C. guilliermondii occur in the area of the genitourinary tract and especially in the genital organs.

Based on the results of hematological examinations carried out during the toxic effect (decreased leukocyte count), a limited degree of phagocytosis and a timely and quantitative decrease in immune response capacity can be presumed. Therefore, on administering fodder infected with C. guilliermondii, when considerable amounts of fungal toxin can also get into the organism in addition to the fungus bodies, this effect can even more pronouncedly contribute to the development of infection. Taking these into consideration from the aspect of preventing infections, we consider it necessary that the sprouting fungus strains isolated from the samples should also be determined in the course of mycological control of fodders.

The survival of C. guilliermondii in deep-frozen semen kept in liquid nitrogen for 28 days indicates that the infection can be spread by such deep-frozen sperms when used for inseminations. Therefore, studies should be conducted for antimycotics which could be added to diluted semen.

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Table 1. Data on Fungus Suspensions Used for Infection

Key: 1. Introduced into the organism
2. Total ml
3. Cell count/ml
4. Total fungus cells administered
5. Centrifuged wet mass (g)
6. Total about
7. Per kg body weight, about
8. Bull No
9. Standing weight
10. Mode of infection
11. Used for infection
12. Liquid culture
13. Suspension

Graph. Changes in Body Tempera

Key: 1. Day

Table 2. Effect of Oral and I.V. Administration of C. Guilliermondii on the Pulse and Respiratory Rate, and Temperature of Bulls

Key: 1. Bull

2. Pulse

3. Respiration

4. Temperature

5. Before intervention

6. Minutes

7. Hours

8. Days

Remark: The daily data were measured at 17:00 hour.

Table 3. Results of Hematological Tests

Key: 1. Bull

2. Day of blood withdrawal

3. Red blood cells

4. White blood cells

5. Hematocrit

6. Differential count

7. Before infection

8. After infection

9. Designation

Table 4. Changes in Sperm Quality During the Experiment. Mycological Tests

Key: 1. Fresh semen

2. Deep-frozen semen

3. Time of obtaining semen

4. Morphological changes %

5. Live sperm %

6. Primary

7. Secondary

8. Deep-freeze testing

9. After 24 hours

10. After storage for 28 days

11. Result of mycological tests (for C. guilliermondii)

12. Bull

13. Week before experiment

14. After infection

15. Day

16. Volume

17. Mass movement

18. Density

Picture 1. Bull No 5156, orally infected: Sprouting Fungi Among the Epithelial Cells Lining the Epididymal Duct. Grocott reaction, 450x

Picture 2. Bull No 5217, i.v. infected: Sprouting Fungi Among the Epithelial Cells Lining the Epididymal Duct. Grocott reaction, 540x

Picture 3. Bull No 5156, orally infected: Occasional Sprouting Fungi in the Red Pulp of the Spleen. Grocott reaction, 1000x

Picture 4. Bull No 5217, i.v. infected: Occasional Sprouting Fungi in the Red Pulp of the Spleen. Grocott reaction, 1000x

Summary. Two 3-year old, excellent sperm producing bulls were infected i.v. and p.o. with Candida guilliermondii var. guilliermondii strains isolated from bulls. An initial toxicosis and leucopenia was followed by lymphocytosis accompanied by pain of the epididymis and seminal vesicles in both bulls. During the toxic effect, a reddening of the scrotum was noted. Sperm quality became poor and could not be deep-frozen. C. guilliermondii was cultured

from the blood of the p.o. infected bull 2 hours after infection and from the urine of both bulls 3, 5 and 6 hours after infection. Mycological, pathological and histopathological examination of the organs of both animals revealed septicemia. Especially severe lesions were found in the genital organs, renal cortex, lymph nodes and liver.

2473
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PRODUCTION AND INSTALLATION OF A REACTOR CONTROL SYSTEM (SUZ) DRIVE

Budapest GEP in Hungarian Vol 31 No 8, Aug 79 pp 287-290

BAUMRUK, MIROSLAV, Skoda Plant, Plsen

[Abstract] As part of the intergovernmental agreement among CEMA member countries concerning the cooperative construction of the VVER-40 type nuclear power plant, the Skoda Plant was assigned the responsibility for the production of the safety and control units, designated as the SUZ drive. Corrosion-resistant Cr-Ni austenitic and Cr-alloyed martensitic steels were used for the fabrication of the drive. After an extended development period, two prototypes were fabricated and used for testing. The welding, degreasing, cleaning and packaging operations are supervised by representatives of the customer. Figures 1, tables 2, no references.

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COMPLEX CONTROL OF THE WELDING OF STEEL STRUCTURES AND STRUCTURAL ELEMENTS IN THE BUILDING TRADE

Budapest GEP in Hungarian Vol 31 No 8, Aug 79 pp 291-292

HORVATH, IVAN, dr, diplomed mechanical engineer, candidate, Construction Qualification Institute, Budapest

[Abstract] The experience gained in quality control activities related to welded steel structures for the Paks Nuclear Power Plant, carried out by the Construction Qualification Institute on behalf of builder, the State Construction Enterprise, is outlined. The 14736 individual welded units, representing 906 different types of alloys, indicate the range and the complexity of the operations. Since quality control was started in 1975, the percentage of faulty welds decreased regularly; however, the welders appear to be less well qualified to make butt welds which require advanced training. Most of the errors uncovered by quality control checkup were due to dimensional changes and the appearance of gaseous occlusions at the surface of the seam. It was concluded that the quality control inspection was satisfactory. Figures 4, no references.

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BRIEFS

ANALOG COMPUTER INSTALLATION--Several laboratory positions were established and put into operation in the past 5 years through the efforts of the Power Industry Institute. A small quantity of foreign equipment was purchased; the most important item is the ADT-3000 iterative analog computer produced in the CSSR. This computer will soon be complemented with a digital component (ADT-4316), and then the Thermal Equipment Center of the institute will be able to use a hybrid system in mathematical modeling. On the other hand, laboratory equipment for field research in electric power plants requires considerable modernization. [Excerpt] [Warsaw ENERGETYKA in Polish No 9, Sep 79 pp 368-373]

P855M MINICOMPUTER INSTALLATION--A general description of the hardware and software of the system for measuring air pollution was presented. This system has been in operation for 2 years at the Gdansk Refineries. The air pollution control system is operated with the use of a P855M minicomputer from the Philips firm. [Excerpts] [Warsaw POMIARY AUTOMATYKA KONTROLA in Polish No 10, Oct 79 p 43]

DATA TRANSMISSION TERMINALS FORECAST--The following is a forecast of the number of data transmission network terminals in Poland up to 1990: 30 terminals in 1973; 100 in 1974; 200 in 1975; 425 in 1976; 745 in 1977; 1,160 in 1978; 3,060 in 1979; 4,830 in 1980; 29,100 in 1985; 117,000 in 1990. [Excerpt] [Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish No 8, Aug 79 pp 229-234]

R-32 COMPUTER INSTALLATION--An automated data processing system based on a R-32 computer is being successfully utilized at the Voivodship Citizens' Militia Headquarters in Wroclaw. [Excerpt] [Warsaw ZYCIE WARSZAWY in Polish 22 Oct 79 p 2]

ODRA 1305 COMPUTER INSTALLATION--The ODRA 1305 digital computer installed in the Atomic Energy and Power Industry Information Science Center has been operating for a long period of time under the control of a GEORGE 2 operating system. Incorporation of the GEORGE 2 system in the center has been very effective. The most important result is undoubtedly the increased operating efficiency of the computer installation (improvement in the utilization of the hardware resources and reduction in the average turnover time of a task. [Excerpt] [Warsaw INFORMATYKA in Polish Nos 8-9, Aug-Sep 79 pp 22-24]

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